

CLAIMS

1. An optical imaging device (1) suitable for forming optical images of fingerprints of a finger (6), the device comprising:

• an optical plate (2) having first and second opposite main faces (3, 4), at least a portion (5) of said first main face (3) situated in the vicinity of a first end (A) of the plate (2) constituting a finger-press surface for a finger (6);

• at least one light source (S) situated facing a face of said plate (2) at said first end (A) thereof, in order to illuminate said finger (6) through the plate (2); and

• imaging means including a focusing lens (9) that possesses an inlet surface (9₁) and a outlet surface (9₂) determining a magnification factor, and that is situated downstream from the optical plate (2); characterized in that:

• said first and second main faces (3, 4), said face in front of which the light source (S) is situated, and the illumination direction of said light source (S) are arranged mutually in such a manner that the light beam emitted by the source and then reaching (7₁) the finger (6) pressed against said portion (5) of the first main face (3) in order to illuminate said finger, propagates (7₂) thereafter inside the plate (2) with multiple reflections alternately on the first and on the second main faces (3, 4) thereof in order to reach the second end (B) of the plate (2) opposite from said first end (A);

• said plate (2) has an end face (8) at its second end (B) that is inclined, at least in part, so that the light beam leaves the plate via said inclined end face (8) without being subjected to significant refraction or reflection;

the focusing lens (9) is disposed facing said inclined face (8) of the second end (B) of the plate (2) with its optical axis extending substantially in the midplane of the plate between said main faces and extending substantially parallel to said inclined face (8); and

a first mirror (10) is placed facing the inlet surface (9₁) of said focusing lens (9) and is oriented in such a manner as to receive a portion of the light beam coming from said end face (8) of the second end (B) of the plate (2) and reflect it (7₃) towards said inlet surface (9₁) of the focusing lens (9) along the axis thereof.

2. An optical imaging device according to claim 1, characterized in that it further includes a second mirror (11) disposed facing the outlet surface (9₂) of said focusing lens (9) and oriented in such a manner that the light beam coming from the focusing lens (9) is reflected transversely relative to the plate (2).

3. An optical imaging device according to claim 2, characterized in that said second mirror (11) is oriented in such a manner that the light beam is reflected in a direction going away from the finger-press surface (5).

4. An optical imaging device according to any one of claims 1 to 3, characterized in that the first and second main faces (3, 4) of the plate (2) are mutually parallel.

5. An optical imaging device according to any one of claims 1 to 4, characterized in that the first mirror (10) belongs to a first projecting part (12) fitted on the end face (8) of the second end (B) of the plate (2), in such a manner as to extend in line with said plate.

6. An optical imaging device according to any one of claims 2 to 5, characterized in that the second mirror (11) belongs to a second projecting part (13) fitted on the end face (8) of the second end (B) of the plate (2) in such a manner as to extend in line with said plate.

7. An optical imaging device according to any one of claims 1 to 6, characterized in that it further includes a diaphragm situated upstream from and close to the focusing lens.

8. An optical imaging device according to any one of claims 1 to 7, characterized in that the focusing lens (9) is secured to the end face (8) of said second end (B) of the plate (2) via support means (14).

9. An optical imaging device according to claim 8, characterized in that the support means (14) of the focusing lens (9) are arranged to allow the focusing lens (9) to move along its optical axis.

10. An optical imaging device according to claim 6 and claim 8 or claim 9, characterized in that the support means (14) of the lens (9) are constituted in one piece with said second projecting part (13) incorporating the second mirror (11).

11. An optical imaging device according to any one of claims 1 to 10, characterized in that at its first end (A) the plate (2) includes an end face (20) that is inclined at an acute angle relative to said first main face (B), and in that the light source (S) is situated facing said inclined end face (20).

12. An optical imaging device according to any one of claims 1 to 10, characterized in that at said finger-press portion (5) of the first main face (3) of the plate

(2), at least one side face (18) of the plate (2) is inclined at an angle that is acute relative to said first main face (3), and in that the light source (S) is situated facing said inclined side face (18).

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13. An optical imaging device according to claim 12, characterized in that both opposite side faces (18) of the plate (2) are inclined, and in that two light sources (S) are situated facing respective ones of said two inclined side faces.

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14. An optical imaging device according to any one of claims 11 to 13, characterized in that the at least one inclined side face (18) of the plate (2) situated towards the first end (A) thereof is curved in the thickness of the plate (2), with its concave face facing outwards.

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15. An optical imaging device according to any one of claims 1 to 10, characterized in that the light source (S) is not a point source, presenting a significant surface area and being placed facing the bottom main face (4) of the plate (2), substantially facing said finger-press portion (5) provided on the top main face (3), and directed towards it.

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16. An optical imaging device according to claim 15, characterized in that the light source (S) is a matrix (20) of light-emitting diodes, with a ground surface interposed between the light source and the bottom face (4) of the plate (2).

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